NRT M-factor delivery document 01 Mar 2010

Klaus Bramstedt, ife Bremen

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1 Content

This document describes the m–factor dataset, produced by ife/Bremen according to m–factor tech-note [1]. M–factors for the calibration light path (M_CAL), the limb light path (M_DL) and the nadir light path (M_DN) to the science detectors are included. All other m–factors are set to the default value of 1.0, i. e. have no effect. The m–factors are delivered as auxiliary files as defined in the SCIAMACHY IODD [2]. M–factor version is 07.01.

This document describes a delivery within the near real time (NRT) setup of the Envisat ground segment. A delivery is foreseen every 7 days, it contains the calculated data for the past 7 days (including the current day) and an extrapolation for the next 7 days. In nominal case, the extrapolated m–factors will not be used. They are available in case of an early start of the level 1–2 processing or an delay in the m–factor delivery. The current package contains m–factors for:

- Calculated: 23 Feb 2010– 01 Mar 2010
- Prediction: 02 Mar 2010– 08 Mar 2010

Note: If there is no appropriate monitoring measurement for the delivery day available at the time of calculation, also the nominal calculated m–factors may contain predicted values. Especially for M_DN this will be the case, as the corresponding measurement is performed only every 3 days.

2 Delivered files

Table 1 gives the MD5 sums (md5 text mode) [3] and the names of the delivered m-factor files.

Table 2 gives information, how the file content is calculated: Based on actual measurements (*meas.*), an interpolated m–factor (*interp.*) or a predicted, i. e. extrapolated m–factor value (*pred.*) for three light paths.

Table 1: MD5 sum and filename of the delivered m-factor files.

md5-sum	m-factor auxiliary file
4b743b6a0e8be6d9f734577bc69bdf05	SCI_MF1_AXNIFE20100408_101531_20100223_191703_20100225_191703
e275ae7f8237b245059a44e75dddb9c8	SCI_MF1_AXNIFE20100408_101531_20100224_184526_20100226_184526
1bfd8a8da9664652c7d3d576c725b777	SCI_MF1_AXNIFE20100408_101531_20100225_181349_20100227_181349
36204742393eafa7ae41cd5526e312da	SCI_MF1_AXNIFE20100408_101531_20100226_192248_20100228_192248
165ba25e8b1ee7a584b669dddd36d86b	SCI_MF1_AXNIFE20100408_101531_20100227_185111_20100301_185111
3fe0e8c01c64a1f97630b93b6201251d	SCI_MF1_AXNIFE20100408_101531_20100228_181934_20100302_181934
c654c76491e01cae5d869358ad3ba92d	SCI_MF1_AXNIFE20100408_101531_20100301_192832_20100303_192832
fd727d676a26544693d19d2129f50f7c	SCI_MF1_AXNIFE20100408_101531_20100302_185655_20100304_185655
79b3cb364925f55fb5782a1256f753bc	SCI_MF1_AXNIFE20100408_101531_20100303_182518_20100305_182518
7e49fbfd9adec8b519f91245efa9c322	SCI_MF1_AXNIFE20100408_101531_20100304_193417_20100306_193417
937cd79dca26886df935310fa6837f61	SCI_MF1_AXNIFE20100408_101531_20100305_190240_20100307_190240
f313c9ed9a8c70a5896404637284ce90	SCI_MF1_AXNIFE20100408_101531_20100306_183103_20100308_183103
c8d14c48d4015b1d4c99a8de5ba9803a	SCI_MF1_AXNIFE20100408_101531_20100307_194002_20100309_194002
9bd34b49213387b1f3da89f371cf7f76	SCI_MF1_AXNIFE20100408_101531_20100308_190825_20100405_190825

Table 2: Source information for the individual m–factors of the delivery set.

validity identifier	M_CAL	M_DL	M_DN
20100223_191703_20100225_191703	meas.	meas.	interp.
20100224_184526_20100226_184526	meas.	meas.	interp.
20100225_181349_20100227_181349	meas.	meas.	interp.
20100226_192248_20100228_192248	meas.	meas.	meas.
20100227_185111_20100301_185111	meas.	meas.	pred.
20100228_181934_20100302_181934	meas.	meas.	pred.
20100301_192832_20100303_192832	meas.	meas.	pred.
20100302_185655_20100304_185655	pred.	pred.	pred.
20100303_182518_20100305_182518	pred.	pred.	pred.
20100304_193417_20100306_193417	pred.	pred.	pred.
20100305_190240_20100307_190240	pred.	pred.	pred.
20100306_183103_20100308_183103	pred.	pred.	pred.
20100307_194002_20100309_194002	pred.	pred.	pred.
20100308_190825_20100405_190825	pred.	pred.	pred.

3 Content check

M–factors describe the degradation of the instrument and are used to compensate for it in the radiometric calibration. Fast changes with time are not expected, i. e. the ratio $M_{ratio,t}$ of m–factors M_t this delivery to the m–factor M_{t_0} of the previous delivery day should be close to 1. The ratio $M_{ratio,t}$ and its reciprocal value should not exceed a

Table 3: Detector pixels used for the calculations described in this document. SCIAMACHY has 8 channels with 1024 pixels per channel. The pixel range is given as the first and last pixel in each channel. For channel 2, the pixel number is given in wavelength order, i. e. the pixel numbers are already reversed.

channel	1	2	3	4	5	6	7	8
pixel	197	1140	2131	3117	4151	5226	6154	7178
range	784	1859	2943	3925	4863	5914	7157	8181

Table 4: Content check results.

	max. ratio (ch. 6/7: median)			mean ratio				
	M_CAL	M_DL	M_DN	M_CAL	M_DL	M_DN	limit	status
1	1.0053	1.0186	1.0183	1.0006	1.0067	1.0059	1.0400	OK
2	1.0019	1.0068	1.0066	1.0006	1.0028	1.0029	1.0200	OK
3	1.0005	1.0022	1.0032	1.0001	1.0006	1.0021	1.0100	OK
4	1.0005	1.0006	1.0029	1.0000	1.0002	1.0022	1.0100	OK
5	1.0011	1.0021	1.0018	0.9997	0.9993	1.0010	1.0120	OK
6	1.0019	1.0017	1.0013	0.9996	0.9991	1.0001	1.0100	OK
7	1.0020	1.0005	1.0016	–	–	–	1.0070	OK
8	1.0045	1.0027	1.0005	–	–	–	1.0120	OK

certain limit l:

$$M_{ratio,t} = \frac{M_t}{M_{t_0}} \qquad \text{with} \quad M_{ratio,i} < l \qquad \text{and} \quad \frac{1}{M_{ratio,i}} < l \tag{1}$$

This limit is defined for each channel. The limits are derived from a time-series of deliveries simulated for 2007 [1]. For channel 1 to 6, each individual pixel for each dataset has to meet the criteria. Channel 7 and 8 are the infrared detectors with a varying number of bad or dead pixels with unpredictable behavior. A criterion for each pixel is not applicable, therefore a median over the channel is used as $M_{ratio,t}$ and has to meet the criteria. Blind pixels, the overlap regions and channel 6+ are excluded from the calculations, see table 3.

The previous delivery day t_0 is 22 Feb 2010, therefore M_{t_0} is taken from the m–factor file `SCI_MF1_AXNIFE20100408_100422_20100222_194840_20100224_194840` .

Table 4 summarizes the results for this delivery. Also the settings for the limit are given. For information only, also the mean ratio is given. *OK* in the last column means, that the criteria is fulfilled for the channel.

This delivery is within all limits and can be used.

4 Visualization of content check

Figure 1 shows the ratio $M_{ratio,t}$ for all delivered m–factors for each channel. The grey boxes visualize the maximum ratio allowed.

References

[1] Bramstedt, K, Calculation of SCIAMACHY M-Factors, *Technical note*, IFE-SCIA-TN-2007-01-CalcMFactor, Issue 1, ife Bremen, 2008.

[2] Balzer, W, and Slijkhus, S, *Technical document*, SCIAMACHY Level 0 to 1b Processing Input / Output Data Definition, ENV-TN-DLR-SCIA-0005, Issue 5, DLR Oberpfaffenhofen, 2000.

[3] RFC 1321 - The MD5 Message-Digest Algorithm, *Internet RFC/STD/FYI/BCP Archives*, 1992

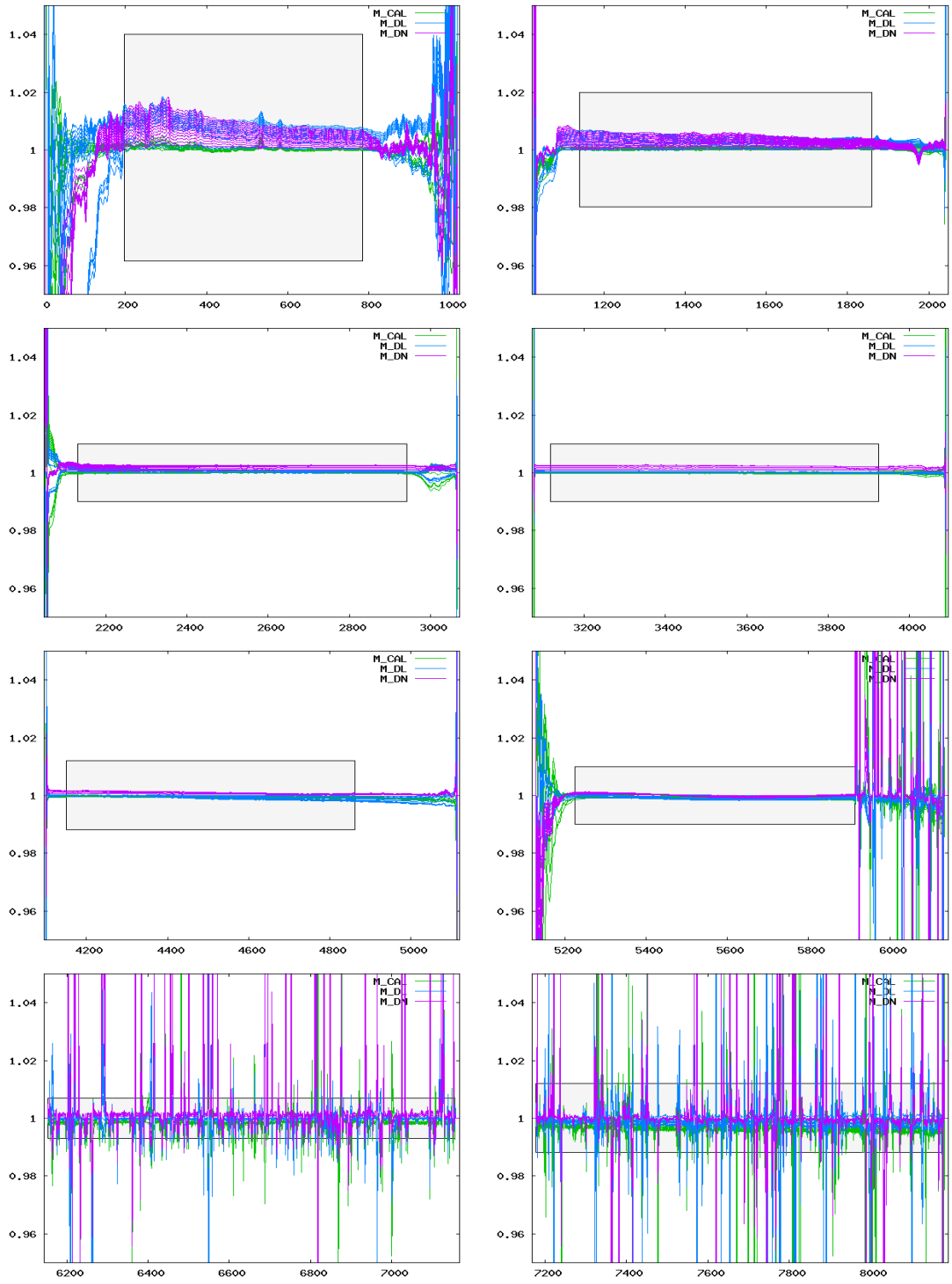

Figure 1: Ratio of delivered m-factors (23 Feb 2010– 08 Mar 2010) to the corresponding m-factor of the previous delivery day (22 Feb 2010). The grey boxes visualize the maximum ratio allowed.